Jetstream-31 (J31) Flight Report for INTEX-ITCT
Flight 10 - 17 July 2004

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Terra overpass profiles and near-surface leg, with profiles near Ron Brown

Overview

This was the fourth J31 flight out of Pease. Goals were:

1. Terra overpass (1113 EDT): profile down @ pt. D (see map below), low-level (200ft) run to pt. E and pt. A, stepped ascent @ pt. A, transit to Ron Brown,
2. transit to Ron Brown and possible profiles at Ron Brown to compare to lidar.

J31, its instruments, and communication with the Ron Brown all performed very well. Flight plan was altered soon after arrival at pt. D due to cloud situation (see below).

Flight Path, Timing, and Measurements

Flight path is shown in Figure 1 below. Engines on at ~09:55EDT. Takeoff was planned for 10:15 EDT, actual take-off was at 10:15 EDT.

We climbed out on a 'ramp-ascent' towards pt. D. Upon arrival at pt. D, there was increased Ci-cloud coverage toward point E. Therefore, we decided to stay in the vicinity of pt. D and try to find a cloud free area there for the Terra overpass time at 11:13EDT. We performed a spiral descent, followed by low-level legs oriented mostly SW to NE. We found a small clearing in the Ci formation in the vicinity of a low level Stratus deck at satellite overpass time. Initial post-flight analysis and cloud screening determined that there was about a 6 minute time period of essentially Ci-cloud free measurements. Mid-visible aerosol optical depths at 200ft flight altitude were between 0.06 and 0.1.

The main objective for SSFR was to measure the water leaving radiance, or the ocean surface spectral albedo, to support validation of MISR low aerosol optical depth retrievals. MISR typically uses only the red and near-infrared "dark water" bands for its aerosol retrievals. Ocean surface reflectance is assumed negligible in these bands in the current algorithm but it is not always negligible in the green and the blue, especially for low aerosol optical depth, and may not be negligible across the entire visible spectrum in shallow or polluted waters. The MISR team is developing an algorithm that uses multi-angle data to simultaneously retrieve surface reflectance and aerosol properties over shallow polluted waters. Even with a well-constrained atmospheric column, unless the surface contribution to top-of-atmosphere reflectance is known there remain significant uncertainties in the resulting retrieved aerosol properties and for low optical depth cases the sea's surface albedo contributes largest uncertainty. The 17 July J-31 flight was conducted near the NH coast over shallow water and under nearly ideal conditions of very low aerosol optical depth. But it was only "nearly" because of the scattered thin cirrus to the west and south of the scene. At the time of the overpass, however, it did appear clear overhead and will likely have a negligible effect on the measured spectral albedo.

After the low-level flight legs during Terra overpass, the J-31 rendezvoused with the Ron Brown, found the Ron Brown under cloudy conditions and returned to base. At 12:02 EDT we touched down. Engines-off was at 12:07 EDT.

Instrument Performance
Position and Orientation System (POS): Position accuracy from 6 to <1 m throughout flight.

Nav/Met: Data displayed by AATS looked good. No data dropouts.

SSFR: Was always working. See measurement description for science accomplishments.

AATS: Tracking well. No signs of contamination from the previous flight (Flight 09, July 16) on the window prior to flight.

Notes, Insights
Pilots described the communications with flight controllers to be much improved as a result of their meeting with the FAA on July 16, 2004.

In future flights, pilots need to receive several flight plans, in particular if there is the possibility that we may want to divert flights South towards the Boston-Logan airport flight control area.

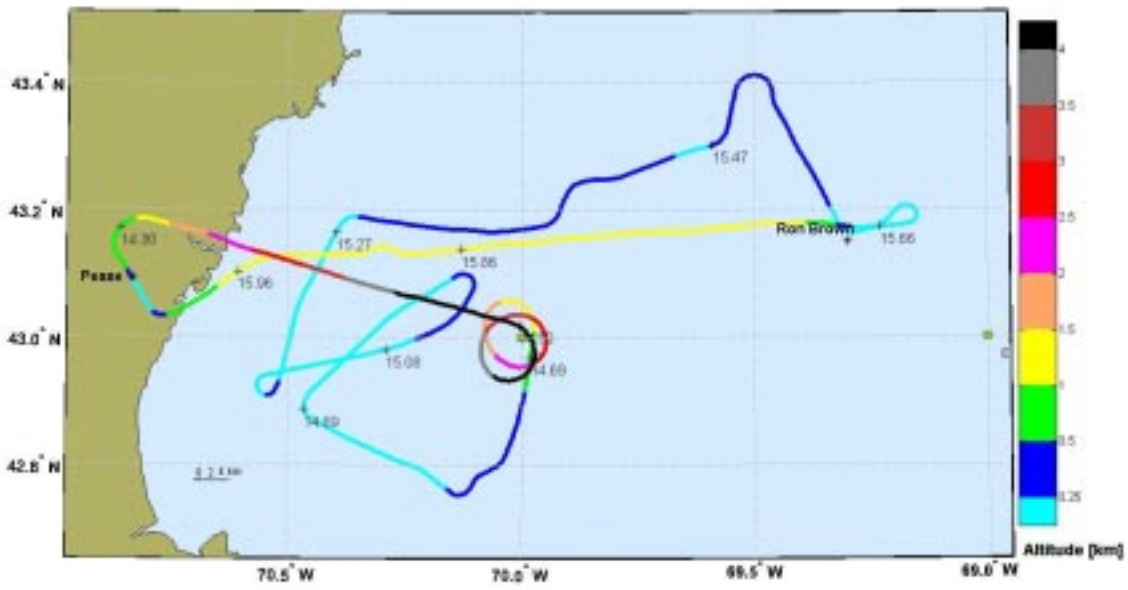

Figure 1. Flight track of J-31, Flight 10, July 17, 2004.

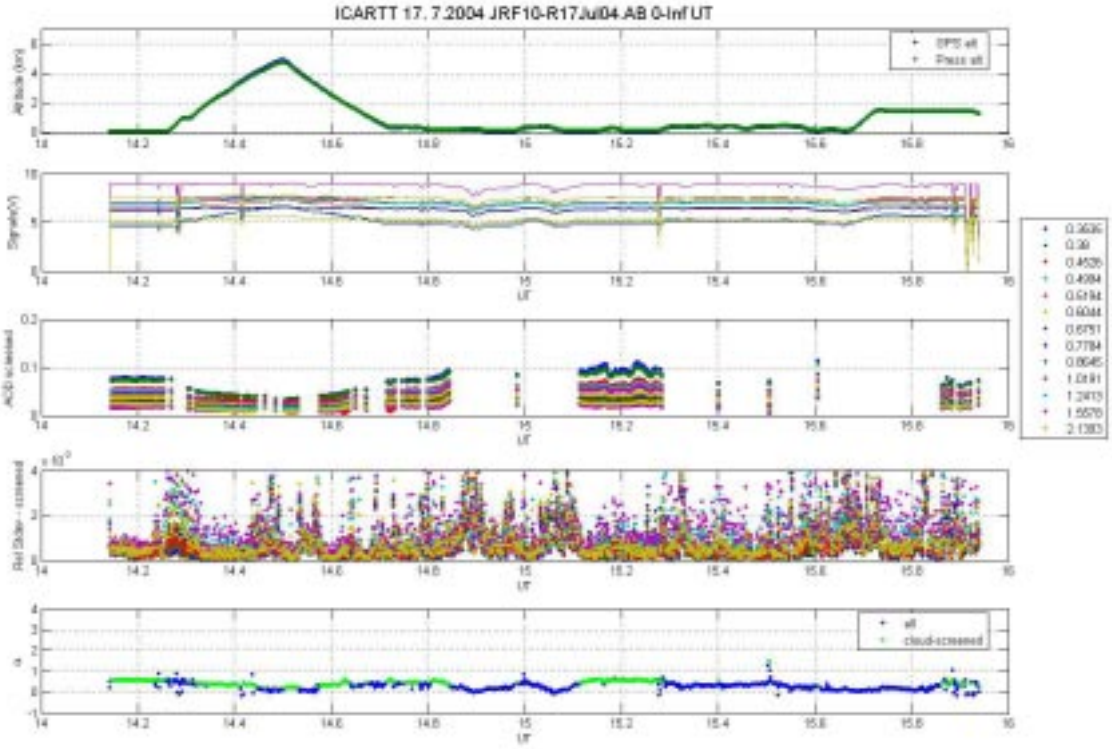

Figure 2. Time series of flight altitude, AATS-14 signals, derived aerosol optical depths, standard deviation of signals, and modified Ångstrom exponent for J-31, Flight 10, July 17, 2004.